

# TWO NEW MESOAMERICAN SPECIES OF *CHUSQUEA* (POACEAE: BAMBUSOIDEAE)<sup>1</sup>

LYNN G. CLARK<sup>2</sup>

## ABSTRACT

Two new Mesoamerican species of *Chusquea* are described and illustrated, both from complete collections of vegetative and flowering material. *Chusquea grandiflora*, a cloud-forest species from Panama and northwestern Colombia, has infravaginal branching, long, relatively narrow foliage leaves, open panicles, and rather large spikelets. It is allied to *C. longifolia* Swallen and related species. *Chusquea aperta* occurs in pine-oak cloud forests in Oaxaca, Mexico. It also has infravaginal branching and open panicles, but its foliage leaves are smaller, wider, yellowish-green, and strongly tessellate abaxially. This species is probably most closely related to *C. nelsonii* Scribn. & Smith, and *C. muelleri* Munro.

During preparation of a treatment of *Chusquea* Kunth for *Flora Mesoamericana*, examination of herbarium material revealed the existence of two more undescribed species of this diverse bamboo genus. Both are represented by complete collections of vegetative and flowering material. For explanation of terminology relating to the vegetative parts, especially buds and branching, see Clark (1985). In the specimen citations, a flowering specimen is indicated by the insertion of (fl) after the collection date.

***Chusquea grandiflora*** L. G. Clark, sp. nov. TYPE: Panama. Panamá: along road past Cerro Jefe toward La Eneida, 6 Jan. 1971 (fl), Croat 13070 (holotype, ISC; isotypes, COL, CR, K, MEXU, MO as two sheets, PMA, US). Figure 1A–D.

Culmi scandentes, usque ad 18 m longi. Folia culmorum 16–50 cm longa; vaginae 12–33 cm longae, 2–3-plo longiores quam laminae, abaxiales scabrae superne; laminae 4–17 cm longae, abaxiales scabrae; cingulum 2–3 mm longum. Nodi gemma centralis singularis triangularis subtenta gemmis numerosis ( $\pm 50$ ) parvioribus subaequantibus. Ramificatio infravaginalis. Laminae foliorum 8–20 cm longae, (0.5–)0.7–1.4 cm latae, L:W = 11–27, glabrae, non tessellatae, apicibus brevi-setosis, basibus attenuatis. Inflorescentia aperta, paniculata, 6–11 cm longa; rhachis triquetra, pubescens; rami breves patentes, angulati, pubescentes. Spiculae 9.7–12.6 mm longae, scaberulae. Glumae 2; gluma I 2–2.4 mm longa, 1-nervis; gluma II 2.2–4.8 mm longa, 1–3-nervis. Lemmata sterilia 2; lemma sterile I subulatum, 5.2–6.7 mm longum, 5–7-nerve; lemma sterile II subulatum, 7–9.5 mm longum, 7-nerve. Lemma fertile subulatum, 8.4–10.9 mm longum, 7–9-nerve. Palea bicarinata, 6.9–10.2 mm longa, 6–8-nervis.

Culms clambering, viny, to 18 m long. Internodes terete, smooth to scabrous-hirsute just below the nodes. Culm leaves 16–50 cm long, the juncture of sheath and blade abaxially indistinct; sheaths 12–33 cm long, 2–3 times as long as the blade, abaxially smooth at the base, scabrous toward the apex; blades erect, usually persistent, 4–17 cm long, abaxially scabrous; girdle well-developed, 2–3 mm wide, glabrous; corky ridge present at the juncture of the sheath and girdle. Nodes with one triangular central bud subtended by numerous (up to 50) smaller, subequal subsidiary branches; sheath scar dipping markedly below the bud/branch complement. Branching infravaginal; the central bud developing tardily or sometimes not at all; leafy subsidiary branches not rebranching. Foliage leaves with sheaths glabrous, the margins ciliate near apex; blades 8–20 cm long, (0.5–)0.7–1.4 cm wide, L:W = 11–27, the adaxial surface glabrous, the abaxial surface glabrous, not tessellate, the apex short setose, the base attenuate; pseudopetiole more or less distinct, 2–4 mm long; outer ligule evident, to 1 mm long; inner ligule truncate, asymmetrical, 1–1.5(–2) mm long. Inflorescence an open panicle 6–11 cm long, usually not fully exerted from the subtending sheath; rachis triquetrous, pubescent; branches strongly spreading, angular, pubescent, the lower ones short, up to 3 cm long; pedicels 1–2 mm long, angular, pubescent. Spikelets 9.7–12.6 mm long, scaberulous. Glumes 2; glume I ca.  $\frac{1}{5}$  the spikelet length, 2–2.4 mm long, apically acute, abaxially scaberulous, 1-nerved; glume II ca.  $\frac{1}{3}$  the spikelet length, 2.2–4.8 mm long, apically pointed, abaxially scabrous, 1–3-

<sup>1</sup> I thank Dr. Richard W. Pohl for reviewing this manuscript, and Dr. Gerrit Davidse for editorial and agrostological assistance.

<sup>2</sup> Department of Botany, Iowa State University, Ames, Iowa 50011, U.S.A.





FIGURE 1. *Chusquea grandiflora* and *C. aperta*. A–D. *C. grandiflora*.—A. Culm leaf with emerging branches, scale = 1 cm.—B. Inflorescence, scale = 1 cm.—C. Spikelet, scale = 1 mm.—D. Foliage leaf blade, abaxial view, scale = 1 cm. (A, D based on Soderstrom 2014, B, C based on Croat 13070.) E–H. *C. aperta*.—E. Culm leaf with emerging branches, scale = 1 cm.—F. Foliage leaf blade, adaxial view, scale = 1 cm.—G. Inflorescence, scale = 1 cm.—H. Spikelet, scale = 1 mm. (E based on Soderstrom 2237, F–H based on Soderstrom 2239.)

nerved. *Sterile lemmas* 2; sterile lemma I ca.  $\frac{1}{2}$  the spikelet length, 5.2–6.7 mm long, apically subulate, abaxially scaberulous, 5–7-nerved; sterile lemma II ca.  $\frac{7}{8}$  the spikelet length, 7–9.5 mm long, apically subulate, abaxially scaberulous, 7-nerved. *Fertile lemma* 8.4–10.9 mm long, apically subulate, abaxially scaberulous, 7–9-nerved. *Palea* 2-keeled, sulcate except toward the

base, 6.9–10.2 mm long, apiculate, abaxially scaberulous, 6–8-nerved, the sulcus pubescent. *Lodicules* 3; 3–3.5 mm long. *Stamens* 3; anthers 4.3–5.5 mm long. *Fruit* unknown.

*Additional specimens examined.* COLOMBIA. ANTIOQUIA: along camino between Alto del Tigre and El Socorro, E of Argelia, 1 Jun. 1944 (fl), Core 817 (US). CHOCÓ: Emisora La Sirena, 3 km W of La Mansa



at top of Cord. Occidental, *Gentry & Renteria* 24203 (US). PANAMA. CHIRIQUÍ: Vicinity of Gualaca ca. 7.8 mi. from Planes de Hornito, La Fortuna on road to dam site, *Antonio* 5182 (MO, US); camino hacia la finca Landau, NE del campamento de Fortuna (sitio de presa), 6 Sep. 1976 (fl), *Correa et al.* 2185 (F, MO, NY). COCLÉ: El Valle, *Soderstrom* 2014 (US). PANAMÁ: Cerro Jefe, near tower, *Antonio* 4473 (MO, US); Cerro Jefe, *Croat s.n.* (MO); top of Cerro Jefe near antenna, 17 Oct. 1977 (fl), *Folsom & Page* 5944 (MO, PMA, US, VEN); La Eneida, 12 km N of Goofy Lake, *Soderstrom* 2006 (US). VERAGUAS: Cerro Tute, trail past agricultural school near Santa Fe, *Antonio* 1878 (MO).

*Chusquea grandiflora* is characterized by infravaginal branching, culm leaves abaxially scabrous (except basally), open panicles with short, spreading primary branches, pubescent rachis, and scaberulous spikelet with glume II usually twice as long as glume I. This species is known from montane forests at altitudes of 700 to 1,700 m in Panama and northwestern Colombia. *Gentry & Renteria* 24203, a vegetative specimen referred to this species, was collected at 2,300–2,400 m.

*Chusquea grandiflora* lacks the leafless, fibrillar branchlets so characteristic of *C. scabra*, but otherwise the two species are strikingly similar vegetatively. *Chusquea scabra* usually exhibits much more rounded leaf bases and consistently scabrous internodes. *Chusquea grandiflora* is also closely related to *C. foliosa* L. G. Clark, *C. longifolia* Swallen, and *C. patens* L. G. Clark, sharing infravaginal branching and long, relatively narrow foliage leaves with these three species. The open panicles with strongly spreading branches of *C. grandiflora* and *C. patens* are similar in some specimens, but *C. grandiflora* is distinguished by its pubescent rachis, shorter inflorescence branches, larger spikelets, and wider foliage leaf blades.

***Chusquea aperta*** L. G. Clark, sp. nov. TYPE: Mexico. Oaxaca: 107 km SW of Tuxtepec, 2,650 m, 4 Oct. 1977 (fl), *Soderstrom* 2239 (holotype, US). Figure 1E–H.

Culmi usque ad 1 cm diam., usque ad 1–2 m alti. Folia culmorum: vaginae persistentes, 6.8–8.5 cm longae, laeves; lamina triangularis, 1 cm longa, laevis; cingulum asymmetricum, ad 5 mm longum, prominens non nisi prope gemmam. Ramificatio infravaginalis. Laminae foliorum rigidae, 7–12 cm longae, 0.8–1.5 cm latae, L:W = 7–11, glabrae, valde tessellatae inferne, apicibus brevi-setosis, basibus rotundatis vel attenuatis. Inflorescentia aperta, paniculata, 7–11 cm longa, exserta; rhachis triquetra, glabra; rami patentes, usque ad 4–6 cm longi, angulati, glabri. Spiculae 6–8 mm longae, glabrae, adpressae. Glumae 2, squami-

formes; gluma I 0.3–0.5 mm longa, enervis; gluma II 0.4–0.8 mm longa, enervis. Lemmata sterilia 2; lemma sterile I apiculatum, 4–4.6 mm longum, 1–3-nerve; lemma sterile II subulatum, 4.5–5.1 mm longum, 1–5-nerve. Lemma fertile subulatum, 5.7–7.1 mm, 7-nerve. Palea bicarinata, 5.5–6.8 mm longa, 4–6-nerve.

*Culms* to 1 cm diam., to 1–2 m tall. *Internodes* terete, solid, smooth. *Culm leaves* with the sheaths persistent, the overlapping margin fused to the sheath to 5 mm above the base, 6.8–8.5 cm long, abaxially smooth; blades evidently not persistent, in the one example seen, blade triangular, 1 cm long, abaxially smooth; girdle asymmetrically developed, prominent only near the bud complement, to 5 mm wide; inner ligule 2–3 mm long. *Nodes* swollen, the central bud subtended by up to 25–30 subsidiary branches; supranodal ridge prominent. *Branching* infravaginal, the central bud often developing; leafy subsidiary branches occasionally rebranching. *Foliage leaves* with the blades stiff, 7–12 cm long, 0.8–1.5 cm wide, L:W = 7–11, yellowish-green, the adaxial surface smooth and not tessellate, the abaxial surface smooth and strongly tessellate, the apex short-setose, the base rounded to attenuate; pseudopetiole usually distinct, 2–3 mm long; outer ligule a stiff rim to 0.5 mm long; inner ligule elongate, 2–9 mm long, rounded to acute at the tip. *Inflorescence* an open panicle 7–11 cm long, completely exserted from the subtending sheath on a peduncle up to 12 cm long; rachis triquetrous, glabrous; branches spreading, angular, glabrous, the lower branches to 4–6 cm long; pedicels variable, to 14 mm long, angular, glabrous. *Spikelets* 6–8 mm long, glabrous, appressed to branches. *Glumes* 2, scalelike, less than  $\frac{1}{10}$  the spikelet length; glume I 0.3–0.5 mm long, nerveless; glume II 0.4–0.8 mm long, nerveless. *Sterile lemmas* 2,  $\frac{2}{3}$ – $\frac{3}{4}$  the spikelet length; sterile lemma I 4–4.6 mm long, apiculate, glabrous, 1–3-nerved; sterile lemma II 4.5–5.1 mm long, subulate, glabrous, 1–5-nerved. *Fertile lemma* 5.7–7.1 mm long, subulate, glabrous, 7-nerved. *Palea* 2-keeled, the upper half sulcate, 5.5–6.8 mm long, acute, glabrous, 4–6-nerved. *Lodicules* 3. *Stamens* 3; anthers 4–5 mm long. *Fruit* unknown.

*Additional specimens examined.* MEXICO. OAXACA: ca. 0.5 mi. N of summit pass, ca. 18 mi. SW of La Esperanza, Highway 175 ca. Km 109, *Bauml & Kimnach* 499 (US); 50 km después de Guelatao rumbo a Tuxtepec, *Beetle* 5016 (US); 30 mi. NE of Guelatao along Hwy. 175 to Tuxtepec, 16 Aug. 1975 (fl), *Davidse & Davidse* 9733 (MO, US); on road between Oaxaca and Tuxtepec, 11 Apr. 1975 (fl), *Fisher & Engleman* 75-41 (MO); Distrito de Ixtlán, Sierra de Juárez, ruta



175 Tuxtepec a Oaxaca, ca. 0.5 km al S de Cerro Pelón, 13 Apr. 1982 (fl), *Lorence et al.* 4004 (US); 108 km SW of Tuxtepec on road to Oaxaca, *Soderstrom* 2237 (US).

According to label data, *Chusquea aperta* occurs in pine-oak cloud forests at elevations from 1,670 to 2,750 m. At present, this species is known only from a relatively restricted area of Oaxaca, Mexico, on the road between Oaxaca and Tuxtepec. *Chusquea aperta* is characterized by infravaginal branching, deciduous culm leaf blades, stiff, yellowish-green foliage leaves with blades strongly tessellate abaxially, and long-exserted, open panicles with spikelets appressed to the spreading branches. Vegetatively, *C. aperta* resembles *C. nelsonii* Scribn. & Smith, but can be distinguished by its glabrous, abaxially tessellate foliage leaf blades, in contrast to the narrower, abaxially pubescent, non-tessellate leaf blades of the latter species. The inflorescences and spikelets of *C. aperta* are similar to those of *C. muelleri* Munro (= *C. carinata* Fournier and *C. mexicana* Hackel), but the inflorescences of *C. muelleri* are smaller, less open, and not long-exserted. With regard to the spikelets, the glumes of *C. aperta*

are both small and scalelike, while the glumes of *C. muelleri* are more developed, with the second glume usually about twice as long as the first.

The type specimen exhibits mostly older, spent inflorescences (but still with some spikelets), and a few younger, fresh inflorescences derived from regrowth of subsidiary branches. These newer spikelets are just at anthesis, and are slightly larger and fuller than the old spikelets produced during the primary flowering period. The newer spikelets are unusual because they all have a one- or two-keeled palea-like bract in the axil of the second sterile lemma. I observed individual spikelets with two fertile florets subtended by two sterile lemmas in some specimens of a few *Chusquea* species, but this is the first indication of a rudimentary floret in the position of a sterile lemma. No other flowering specimens of *C. aperta* show this condition. The abnormal spikelets were left out of the description.

#### LITERATURE CITED

- CLARK, L. G. 1985. Three new species of *Chusquea* (Gramineae: Bambusoideae). *Ann. Missouri Bot. Gard.* 72: 864–873.